

3.4 Find and Use Slopes of Lines

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x}$$

Find the slope.

1. A(1, 3) B(-2, -3) C(8, -2) D(5, 3)

$$m = 2$$

$$m = \frac{3 - (-2)}{5 - 8} = \frac{5}{-3}$$

3. E(8, 1) F(4, 1) G(-2, 1) H(-2, -5)

$$m = \frac{1 - 1}{8 - 4} = \frac{0}{4}$$

$$m = 0$$

Horizontal line
eg: $y = 1$

$$m = \frac{-6}{0} \text{ undefined (no slope)}$$

vertical
eg: $x = -2$

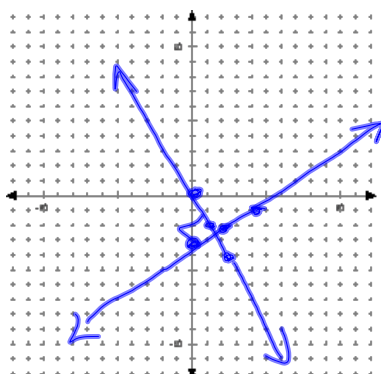
Parallel lines have the same slopePerpendicular lines have slopes that are opposite reciprocals
ex: $m = \frac{2}{3} \perp m = -\frac{3}{2}$

$$y = mx + b$$

$$y = \frac{1}{2}x - 3$$

$$(0, -3)$$

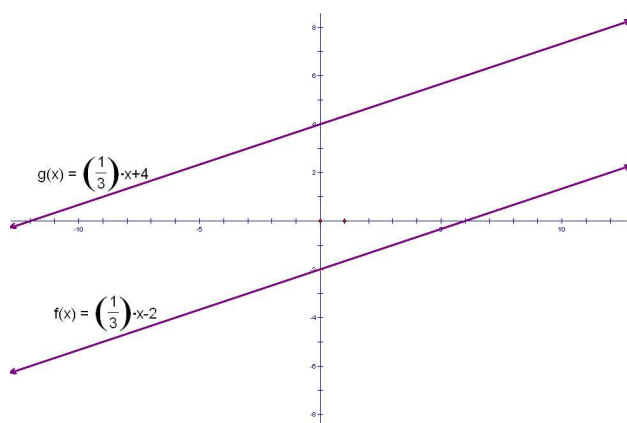
$$m = \frac{1}{2}$$



Give an equation of a line to the line above

$$y = -2x$$

Graph the two equations listed.



3-5 Write and Graph Equations of Lines

Slope-intercept form $y = mx + b$

$$m = \text{slope} \quad b = y\text{-int}$$

Standard form $Ax + By = C$

A, B, & C are integers, A is positive,

A, B, & C have a GCF of 1

Write the equation of the line given the following information.

1. (0, 8) $m = 3$

$$y = mx + b$$

$$y = 3x + b$$

$$y = 3x + 8$$

2. (-3, -6) $m = 2$

$$y = mx + b$$

$$y = 2x + b$$

$$-6 = 2(-3) + b$$

$$0 = b$$

$$y = 2x$$

3. (6, -3) (8, -9)

$$m = \frac{-9 - (-3)}{8 - 6} = \frac{-6}{2} = -3$$

$$y = -3x + b$$

$$-3 = -3(6) + b$$

$$15 = b$$

$$y = -3x + 15$$

4. Write the equation of the line \perp to $2x + y = 5$ and passes through (1, -7).

$$\perp$$

$$m = \frac{1}{2} \quad (1, -7)$$

$$y = \frac{1}{2}x + b$$

$$-7 = \frac{1}{2}(1) + b$$

$$-7\frac{1}{2} = b$$

$$y = \frac{1}{2}x - 7\frac{1}{2}$$

$$- \frac{1}{2}x + y = -7\frac{1}{2}$$

$$x - 2y = 15$$

Put in standard form.

5. Write the equation of the line \parallel to $3y - x = 4$ and passes through (3, 10).

$$y = \frac{1}{3}x + 9$$

6. Write the equation of the line to the line containing (4, 3) and passing through (2, -9).

$$m = \frac{8-3}{4-4} = \text{undefined}$$

vertical

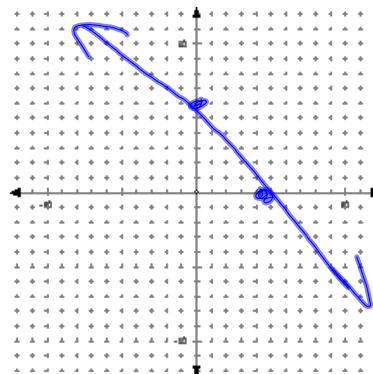
horizontal (2, -9)

$$y = -9$$

Graph $3x + 2y = 12$ using intercepts.

If $y = 0$
 $x\text{-int } (4, 0)$

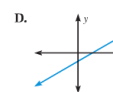
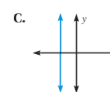
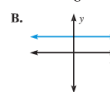
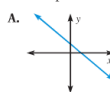
If $x = 0$
 $y\text{-int } (0, 6)$



HW p175 #s 3-6, 9, 10, 13, 14
 p184 #s 16, 17, 24, 31, 34

MATCHING Match the description of the slope of a line with its graph.

3. m is positive. 4. m is negative. 5. m is zero. 6. m is undefined.



FINDING SLOPE Find the slope of the line that passes through the points.

9. $(-5, -1), (3, -1)$ 10. $(2, 1), (0, 6)$

TYPES OF LINES Tell whether the lines through the given points are *parallel*, *perpendicular*, or *neither*. Justify your answer.

13. Line 1: $(1, 0), (7, 4)$
 Line 2: $(7, 0), (3, 6)$

14. Line 1: $(-3, 1), (-7, -2)$
 Line 2: $(2, -1), (8, 4)$

WRITING EQUATIONS Write an equation of the line that passes through the given point P and has the given slope m .

16. $P(-1, 0)$, $m = -1$

17. $P(5, 4)$, $m = 4$

PARALLEL LINES Write an equation of the line that passes through point P and is parallel to the line with the given equation.

24. $P(-7, -4)$, $y = 16$

PERPENDICULAR LINES Write an equation of the line that passes through point P and is perpendicular to the line with the given equation.

31. $P(-1, 1)$, $y = \frac{7}{3}x + 10$

34. $P(0, -5)$, $x = 20$